From the desk of...

Equipment donations to universities

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Frequently, universities ask Bently Nevada to donate equipment to enhance their Mechanical Engineering Programs. This can be very worthwhile, and provide major positive returns to both the university and to industry.

Most schools with Mechanical Engineering Programs do not have an applied Rotor Dynamics Program. The curriculum usually does have a "Vibrations" course. This course, however, usually examines structure borne vibration with a single degree of freedom. Although this provides some basic understanding, it neglects rotor dynamic fundamentals. Bently Nevada would like to support universities that are interested in providing a modern rotor dynamics curriculum that prepares students to meet the challenges of modern industry. The following basically outlines our criteria for equipment donations.

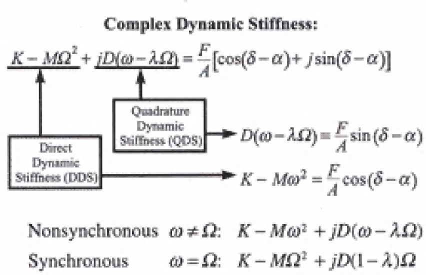
There was a time when rotating machine behavior was limited to overall amplitude and spectrum measurements; however, today there are many tools to help a student understand how a rotor system behaves. We encourage universities to use modern data acquisition and display equipment like ADRE® for Windows or Data Manager® 2000 for Windows NT. These tools allow for a wider range of both steady state and transient (for example, startup, shutdown, load change, etc.) plot formats. Typically, a university may be using only a spectrum "analyzer" as its data acquisition/display tool. The spectrum plots provided by the "analyzer" are good; however, a comprehensive curriculum would also include orbit, timebase, shaft centerline, full spectrum, full waterfall, vibration trend, polar, Bode and full spectrum cascade plots. These diagnostic tools are currently available and are used by modern rotor dynamicists, and thousands of major industrial facilities around the world. The institutions we support use proper machinery diagnostic tools to effectively prepare their students to understand the engineering principles behind the use of the tools they will encounter in the real world.

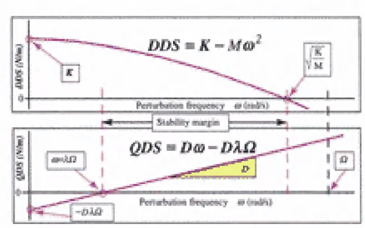
It is very important that the curriculum is not exclusively half spectrum-based. The university program should explain the value of the various plot formats (for example, orbit, timebase, trend, shaft centerline, full spectrum, Bode, polar, etc.) and not be limited to a single plot format. As the saying goes, "To the person whose only tool is a hammer, all problems look like nails." It is very important that the curriculum not be specific to a single plot format.

The Rotor Dynamics Curriculums that we support have a good mix of theory and practice. After students hear a lecture by a professor on a given rotor dynamics topic, they should be allowed to experience it themselves using a Bently Nevada RK4 Rotor Kit (that is, a working model which can simulate the rotor dynamics behavior of many different machines and machine malfunctions) and an appropriate set of modern data acquisition equipment. The RK4 and other data acquisition equipment should be installed in a comfortable lab setting, that is accessible and permanent. The equipment shouldn't be hidden in a cabinet; it should be a major part of a student's learning experience. Each diagnostic labstation can be used by up to six at a time. If more than six students will be working at the same time, additional labstations are required. Each student should take an active roll while working with the labstation and obtain his own hands-on experience.

We find it encouraging that there are colleges and universities that are not satisfied with how things were done 30 years ago and are staying on the leading edge of technological change. The equations a university uses to explain rotor dynamic behavior clearly indicate where their Rotor Dynamics Program is going. In the article "Dynamic stiffness in whirl and whip," found in this issue of the Orbit, you can see how useful the modern rotor dynamic equations are in explaining how a rotating machine behaves. A clear understanding of Dynamic Stiffness and its component parts of Direct and Quadrature Stiffness will help a student go a long way in solving machinery problems in industry. We support only those schools that use these equations to help explain rotor motion.

By combining the latest rotor dynamic research with effective labstations, and lab exercises, a university creates the best learning environment and increases a student's chances of obtaining success in the modern world. We look forward to working with schools that have chosen to be leaders in the field of Rotor Dynamics.





Nonsynchronous Dynamic Stiffness plots to identify parameters